REPORT

OF THE

ACTING SUPERINTENDENT OF THE YELLOWSTONE NATIONAL PARK

TO THE

SECRETARY OF THE INTERIOR.

1905.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
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OFFICE OF SUPERINTENDENT,
Yellowstone Park, Wyo., October 14, 1905.

SIR: I have the honor to submit the following report of the condition of affairs in the Yellowstone National Park and its management since the fiscal year ended June 30, 1904:

IMPROVEMENTS ABOUT THE ROOSEVELT ARCH AT NORTH ENTRANCE TO THE PARK.

The alfalfa field which was planted last year on both sides of the road leading through the archway near the town of Gardiner has proved a great success, and during the past summer has yielded about 100 tons of fine hay. This hay has been stacked up near the soldiers' station, and will be fed out during the coming winter to the antelope and other game at such times as they may need it. This will insure these animals having an ample supply of feed during the entire winter and prevent them from leaving the park in search of food. It has also greatly improved the appearance of the grounds near the main entrance to the park, and presents a very pleasing sight to the tourists immediately after they have passed through the archway.

Some time since 12 small Sequoia trees (*Sequoia gigantea*), from the giant forests in Sequoia National Park, Cal., were, by direction of the Department, shipped to this place with a view to their propagation in the park. Six of these trees have been planted near the Roosevelt Arch and the remainder in suitable places on the plateau at the Mammoth Hot Springs. If we are successful in growing these trees, they will in the future be a matter of great interest to the tourists.

BOUNDARY SURVEY.

As stated in my last report, the entire boundary line of the park has been surveyed, but it has not yet been plainly marked in such a way that a person unfamiliar with the country could cross it without being aware of the fact. I again strongly recommend that an appropriation be obtained from Congress to do this work, and believe that $2,000 will be sufficient for the purpose.

FOREST FIRES.

During the past summer we have again been remarkably free from forest fires in the park. During the early part of the season this was due to frequent rains, but during the latter part it was exceedingly dry and a number of small fires were started, which would have been very serious but for the fact that they were quickly discovered by the patrols and extinguished before they had gotten a good start.

TELEPHONE LINES.

The telephone system throughout the park is not in a satisfactory condition, so far as the administration and police of the park is concerned, and it would greatly facilitate matters in this direction if the Government owned its own line, running directly to all stations throughout the park. We now have on hand 70 miles of telegraph wire, pertaining to the Signal Department, which is intended for use in constructing a line from Fort Yellowstone to Soda Butte station and from the lake to Sylvan Pass station, on the eastern entrance to the park, but on account of the lack of funds and men we have been unable to construct these lines.

The Yellowstone Park Association has placed its lines in excellent condition during the past season by putting up new poles and lines wherever they were needed, and if arrangements could be made with this company to put up cross-arms on their poles and to string a Government wire on them it would greatly improve matters, so far as the park authorities are concerned, and a line such as is needed could be constructed at a comparatively small cost.

HOTELS.

The unusually heavy tourist travel through the park during the past season has shown the necessity for increased accommodations at the Mammoth Hot Springs and at the Grand Canyon. A new hotel should be built at the Mammoth Hot Springs and the one at the Canyon should be remodeled and enlarged.

The hotels throughout the park have generally been run in a very satisfactory manner, and in spite of the heavy travel there have been fewer complaints this year than ever before.

PERMANENT CAMPS.

Mr. William W. Wylie, of Bozeman, Mont., is licensed to conduct camping parties through the park, and is authorized to occupy certain parcels of ground as permanent camps.

His services as to transportation and the conduct of his camps have been entirely satisfactory in every respect.

TRANSPORTATION COMPANIES.

The Yellowstone Park Transportation Company has again increased and improved its plant both as to coaches and horses. During the past season they have been called upon to carry nearly double the number of passengers ever carried before in one season in the history of the company, but in spite of this fact there have been no delays

whatever in the transportation of their patrons through the park, and their service has been satisfactory in every respect. Considering the large number transported through the park, they have been remarkably free from serious accidents of all kinds.

The travel over the Monida and Yellowstone Stage Company's line has also increased considerably, and its service has been entirely satisfactory.

YELLOWSTONE LAKE BOAT COMPANY.

The time has arrived when the Department should take some action as to the matter of transportation on the Yellowstone Lake. For several years past every effort has been made to bring about some amicable arrangement by which the tourists who travel by the various stage companies could have the option of going from the Thumb to the lake outlet, either by stage or by boat, without additional charge; but it seems to be impossible to accomplish anything in this direction.

The Yellowstone Lake Boat Company several years ago, and before any road was constructed from the Upper Geyser Basin to the Thumb, was granted the privilege of placing a small steamboat on the lake, to be run as an excursion boat. After the completion of the road from the Upper Geyser Basin to the Thumb it was permitted to carry such passengers as desired to go from the Thumb to the Lake Hotel, a distance of about 18 miles, for a charge of $3 per head. Tourists who take this trip over the lake regard the charge as exorbitant, and many complaints have been made concerning it.

Many complaints having been made in the past concerning the excessive charges, etc., for the hire of small boats on the lake, it is therefore recommended that some competition be also introduced in this business and that some other individual or company in addition to the Yellowstone Lake Boat Company be authorized to keep small boats for hire, both at the Lake Hotel and at the Thumb lunch station.

The introduction of competition in the small boat business will be no violation of the provisions of the lease of the present boat company, for it is distinctly stated therein that no exclusive privilege is granted to this company to carry on a boat business on the lake.

LARGE GAME IN THE PARK.

The summer tourists in the park seldom have an opportunity of seeing much of the large game, which, to the lover of wild animals, constitutes one of its most interesting features.

The proper time to see and study the wild animals of the park is during the winter, or after the snow has fallen on the mountains to such a depth as to drive them down into the lower country. Up to the present time there have been no proper accommodations in the park during the winter for taking care of those who would like to come in at that season, but in the near future it is probable that this trouble will be remedied by the building of a suitable hotel at Mammoth Hot Springs, within 5 miles of the main entrance of the park. After the snow has fallen it is not necessary to go any farther into the park than this point in order to see all of the wild animals that are to be found within its limits at any season, with the exception of the bear.

It has been only within the last two or three years that these animals could be seen in such close proximity to the Mammoth Hot Springs, and the reasons for this fact are due to a few simple changes in the park management, as follows:

First. No dogs are allowed to run at large in the park, and when they are brought in by campers or others passing through they must be carried in wagons and kept tied up when in camp. It is a fact that any kind of a dog running at large, while he will probably do no harm to the game, will run it all out of the section where it is ranging.

Second. A fence about 4 miles long has been built along the northern line of the park, which excludes all stock that for a number of years has grazed within the limits of the park and completely used up the grass, which is now preserved for the wild animals. No stock of any kind is now permitted to run at large in the vicinity of the Mammoth Hot Springs, and where they formerly grazed during the summer elk and deer can now be seen feeding during the winter. In order to be successful in keeping wild game on any reserve it is absolutely necessary either to preserve their natural feed for them or to supply them with hay, etc., and even where the natural supply of feed is preserved it is well to have a supply of hay on hand, in order to help out the weaker animals each spring, for there is always a period when the old grass is nearly all gone and before the new grass is ready for use which is very trying for all wild animals.

It is for this reason that an effort has been made to a limited extent in the park to feed certain kinds of game each spring. The animals so fed are the sheep, the deer, and the antelope, and the results have been remarkable in at least two ways—it has rendered them exceedingly tame and caused them to recognize man as their friend instead of an enemy; and while they will not permit one to touch them, they can be approached within a reasonable distance at any time without their showing the least sign of fear. It has also resulted in a great improvement in their physical condition, and starts them off in the spring, when the females are about to have their young, in such good shape that few are lost from any cause.

Three years ago a deer was seldom seen anywhere about the Mammoth Hot Springs, and only occasionally a few tracks could be seen in the snow showing where they had crossed over the parade ground of Fort Yellowstone during the night. As a matter of experiment, and with a hope that some of these animals which passed through the post might be induced to come around where they could be seen, a few bales of alfalfa hay were scattered about the parade ground. The result was remarkable, for on the second day after the hay had been put out about a dozen blacktail deer appeared. The next day this number was doubled, and from day to day the number increased, until finally they numbered considerably over 100.

It was extremely interesting to see how quickly these animals lost all fear of human beings, and even when the evening gun is fired within 100 yards of them they pay little or no attention to it, but show much more interest in the lowering of the flag from the staff, which is located in the center of their feeding ground.

The mountain sheep, which are supposed to be the wildest of all of our western animals, have also shown the same friendly disposition under the same conditions, and have become even tamer and

more fearless than the deer. These animals are becoming very rare, and are difficult to find in any section of the country. It is therefore desirable that the few we have in the park should be carefully preserved and their number increased as rapidly as possible. There are now about 100 of these animals that make their home at all times entirely within the limits of the park.

Next to the mountain sheep the antelope are probably the most interesting and attractive animals that we have in the park, and, like the sheep, they are rapidly disappearing throughout the West. The park herd consists of about 1,500 animals, and seems to be increasing in numbers quite rapidly. This increase is due to the fact that they are protected not only in the park, but throughout the State of Montana. The summer range for the antelope is well up on the Yellowstone River and entirely within the park, and in old days their winter range extended far down the Yellowstone and they seldom remained in this section after the first heavy fall of snow. The valley of the Yellowstone north of the park is now completely taken up by ranchers, and their wire fences running in every direction have completely shut off the old winter range of the antelope, and they are now compelled to remain at all times entirely within the limits of the park or very close to its borders. Last fall 800 antelope were counted upon the alfalfa field near Gardiner, and at the same time a number of smaller bands could be seen in the foothills above the field and on the slopes of Mount Everts, on the opposite side of the Gardiner River.

The elk are by far the most numerous of all the large game which we have in the park, and it is a very difficult matter to determine exactly, or even approximately, how many there are. During the summer nearly all of the elk pertaining to the neighboring sections of Wyoming, Idaho, and Montana range entirely within the limits of the park, but during the winter it is probable that at least one-half of this entire number goes out into the neighboring States, but, owing to the rapid settlement of the country and the consequent decrease in the amount of feed, their outside or winter range is decreasing from year to year, and each year they show a greater inclination to remain within or near the borders of the park.

Few people know or realize that each year the bull elk shed their wonderful antlers. Many of these shed antlers have been collected from time to time and are used as fences for protecting the lawns about the Mammoth Hot Springs, but their use for such purposes has been discouraged for the reason that the average tourist, seeing them lying about in such numbers, imagines that there has been a terrible slaughter of elk in the park. The bull elk begin shedding their horns usually about the 1st of March, but sometimes they lose them much earlier, and others carry them until sometime in May. During the period when they are shedding and while the new horns are growing, the bulls are usually found in bands of various sizes, separated entirely from the cows, and living peaceably among themselves. Later on, when their horns become fully developed, which is about the last of September, a change comes over their peaceful natures; they separate and are ready for a fight at any time. This is the beginning of the rutting season, and each bull makes an effort to gather into a herd all of the cows that he can persuade to stay with him, and it is the most interesting period dur-

ing which to study the habits of the elk. The bulls are easily located at this season by their whistling. This is a peculiarly weird sound, which commences with a high, shrill whistle and ends with a roar. It is apparently used as a call for his band of cows or a challenge to other bulls. It is frequently answered by the younger bulls, which roam about some distance away from the herd of cows, but the challenge to fight is seldom accepted.

When President Roosevelt and Mr. John Burroughs were in the park, about two years ago, they climbed to the top of a hill which overlooked a part of the valley of the Yellowstone, near the point where the Lamar River flows into it, and by the aid of powerful field glasses they counted the elk in view, and as a result of their count they concluded that there were 3,000 elk in sight. A number of other bands were seen by the President, but no effort was made to count them. The President's trip, while quite an extensive one, did not cover all of the winter range of the elk, but the number seen by him gave him a very fair idea of what he could find if he wished to do so. As none of these elk ever leave the park and but few of them have died or been killed by mountain lions, it is evident that we still have a goodly number of them in the park, and quite enough to stock it well, even if there were no more.

A large band of elk, some 400 or 500 in number, makes its winter home close to the Mammoth Hot Springs. As long as the condition of the snow will permit, they remain on the south side of the ridge just back of the Mammoth Hot Springs Hotel, but occasionally they can be seen trooping down from this ridge, passing within a few hundred yards of the hotel, on their way to a lower feeding ground, and whenever this happens, it is said, you can look out for a big snowstorm.

In passing from one feeding ground to another the elk frequently encounter very deep snow, and this they pass through in single file, the strongest of the bulls taking the lead so as to break the trail, the leaders falling out one after another as they become exhausted.

There are a number of moose in the park, but they are seldom seen, as they range chiefly along the Upper Yellowstone River and in the southeastern corner of the park, which is a very inaccessible country at present, owing to the lack of roads or trails. The killing of these animals is now prohibited in the State of Wyoming, and it is hoped that they will rapidly increase in numbers, and also move farther up into the park.

When the park was first set aside as a Government reserve, there was quite a large herd of buffalo within its limits, but as there was no law or regulation prohibiting hunting for a number of years after its establishment, this herd was soon reduced to a very small one, and what was left of it was driven back into the most inaccessible part of the park, and into an exceedingly unfavorable country for buffalo to winter in. There are now about 30 of these animals left, and they have been located for a number of years on the head of Pelican Creek. The only way that they can keep alive during the winter is by grazing on the few places kept open by the hot springs, for their range is very high and snow falls there very deep and remains until late in the spring. They could be driven out of that locality and possibly a few of them caught up, but it is more

than likely that a greater part of them would be killed in the attempt. Instead of attempting to catch up the old ones, men are sent out early in the spring for the purpose of capturing the young calves, which are brought in to the Mammoth Hot Springs, raised by a domestic cow, and then turned out in an inclosure with the tame herd.

With a view to preventing the buffalo from becoming extinct, in the year 1902 Congress appropriated $15,000 for the purpose of starting a new herd in the park. With this fund a herd of 21 animals was purchased and the necessary inclosures in which to keep them were constructed. The herd purchased consisted of 3 bulls from the Goodnight herd of Texas and 18 cows from the Allard herd of Montana. One of the bulls was turned out with the wild herd on Pelican Creek with a view to introducing new blood in that herd, but he wandered away from them last winter and died on the edge of Yellowstone Lake near the Thumb station. The increase in this new herd has been exceedingly encouraging, and, including the 3 calves which have been caught up from the wild herd, it now consists of 44 animals, which is more than double the number with which we started.

The beaver are certainly increasing rapidly throughout the park, and to-day the signs of their work can be seen along every stream, These exceedingly interesting and valuable little fur-bearing animals have become almost extinct in the greater part of the United States, and should it ever become desirable to restock any section a sufficient number of these animals can, with the permission of the Interior Department, be provided for the purpose.

The bear are about the only animals that the summer tourists can not fail to see, and they are always a great source of amusement and interest to them. It is a difficult matter to make some of the tourists realize that the bear in the park are wild, and that it is a dangerous matter to trifle with them. The black and the brown bear are exceedingly afraid of the grizzly, and with good cause, for they will kill and eat the young of the black and the brown whenever they can get hold of them. It is said the grizzly will also eat its own cubs, and for this reason the females always desert the males when they have their young, and keep away until the cubs are large enough to take care of themselves.

In addition to the above-named animals mountain lions, lynx, and coyotes are also to be found within the limits of the park. As the lions and coyotes are somewhat destructive to other game, such as elk, deer, and sheep, and also a pest to stockmen of the surrounding country, they are destroyed whenever the opportunity affords. The killing of these animals is, however, made a matter of business and not of sport, and only a few persons are permitted to do this killing, and they are scouts and certain good shots among the soldiers. A general permit to kill these animals would result in endless trouble in the matter of protection of other game.

At the last session of the legislature of the State of Wyoming a tract of land extending for a distance of about 25 miles south of the Yellowstone Park and along nearly its entire southern border was set aside and designated as a game preserve. This was an exceedingly wise provision on the part of this State, as it will not only tend to preserve the large game of the State of Wyoming, but will also

assist greatly in the protection of game pertaining to the park along its southern border. In spite of reports to the contrary, large numbers of elk which spend the summer in the Yellowstone Park now winter in this preserve.

FISH AND FISH HATCHERY.

The following report from the United States Bureau of Fisheries shows what work has been done in the park during the past season by the Fish Commission:

DEPARTMENT OF COMMERCE AND LABOR,
BUREAU OF FISHERIES,
Spearfish, S. Dak., September 28, 1905.

SIR: Your letter of September 24, with reference to the work of the Bureau of Fisheries at Yellowstone National Park during the present calendar year, was received upon my return from Hill City to-day.

The following plants of brook trout (*Salvelinus fontinalis*) were made:

May 25, 1905:	
Ice Lake	11,000
Gibbon River, above Virginia Cascade	17,000
May 26, 1905:	
Swan Lake	10,000
Indian Creek and headwaters of Gardiner River	25,000
May 27, 1905, Willow Creek	40,000

The Bureau of Fisheries operated the hatchery at West Thumb from May 29 until August 1, collecting during that time 5,100,000 black-spotted trout eggs (*Salmo clarkii*). Of these eggs 200,000 were shipped to the Government fisheries exhibit, Portland, Oreg.; 50,000 to C. H. Townsend, director New York Aquarium, New York; 565,000 to the Bureau of Fisheries station, Bozeman, Mont.; 91,000 to the Bureau of Fisheries station, White Sulphur Springs, W. Va.

The following plants of fry were made:

July 26, 1905:	
Duck Lake	200,000
Fisheries Creek, West Thumb	127,600
July 31, 1905, Ice Lake, between Fountain Hotel and Excelsior Geyser	47,000

During the period of incubation 450,000 were lost from imperfect fertilization and other causes, and the balance, 3,369,400, were shipped to Spearfish, S. Dak., for hatching.

All the shipments were received in excellent condition, and the fish were unusually vigorous.

Yours, very truly,

D. C. BOOTH,
Superintendent Fisheries Station.

Maj. JOHN PITCHER,
Acting Superintendent Yellowstone National Park.

ENLARGEMENT OF FORT YELLOWSTONE.

My recommendation of last year that this post be increased to a four-troop, or squadron, post is renewed, and it is earnestly hoped that the necessary buildings for the two more troops required may be soon provided. The need of this enlargement is now urgent. At present the buildings and equipment accommodate only two troops of cavalry, which was a sufficient force for the protection of the park at the time the post was built, in 1892, but it is now far from adequate. In the thirteen years that have elapsed since then the game in the park has multiplied almost beyond belief, and there has also been an enormous increase in the number of visitors, the number during the season just ended being 26,188, whereas in 1892 it was only about 4,000.

There has likewise been a steady growth in population around the park, making necessary greater vigilance in guarding the park bound-

aries throughout the year, and all these elements of growth have more than doubled the duties and labors of the troops.

During the summer season this post and its garrison are constantly under the critical observation of visitors from all over the world, and it should therefore be made in all respects a model post.

With the enlargement of the post and its garrison it will be possible to carry on much military training, drill, and other instruction so neccessary to the efficiency of troops, but now impracticable.

The Board of General Officers of the Army that considered and reported on the permanency of army posts in, I think, 1903 recommended that Fort Yellowstone be made a squadron post; a similar recommendation has been made by the commanding general of this department in his report for this year, and an enlargement of the post was recommended by the Chief of the General Staff in 1904.

In my opinion there will be no difficulty in getting the two additional troops as soon as accommodations are provided for them at this post, for the reason that at present there are not sufficient barracks and quarters in this department to accommodate all of the cavalry troops belonging to it.

TOURIST TRAVEL THROUGH THE PARK.

The aggregate number of persons carried through the park over the regular route during the season of 1905 is as follows:

Carried by Yellowstone Park Transportation Company, entering via northern entrance of park	10,881	
Carried by Monida and Yellowstone Stage Company, entering via western entrance of park	2,654	
Others at hotels, traveling with private transportation, bicyclers, etc	1,279	
Total		14,814
Carried by William W. Wylie and accommodated at his permanent camps	3,668	
Carried by other licensees of personally conducted camping parties	1,719	
Total number camping, traveling with licensed transportation		5,387
Total number of tourists traveling through the park with private transportation as "camping parties"		5,987
Grand total of all visitors to the park, season 1905		26,188

During the season 7,362 tourists took the trip across the Yellowstone Lake with the Yellowstone Lake Boat Company. Of this number 3,092 entered the park with the Yellowstone Park Transportation Company, 552 with the Monida and Yellowstone Stage Company, 3,510 with William W. Wylie, and the balance, 208 people, were campers.

CONSTRUCTION AND REPAIRS OF ROADS, BRIDGES, ETC.

The following statement, furnished by Maj. H. M. Chittenden, Corps of Engineers, U. S. Army, who is in charge of improvement work in the park, shows what has been done in the way of building and repairing roads and bridges and other improvements in the park, under the appropriations made by Congress for this purpose. It also gives an estimate of what should be appropriated for future work along the same lines.

IMPROVEMENT OF YELLOWSTONE NATIONAL PARK.

The work which has been done during the past fiscal year, and which will be practically completed by the close of the present season, has been carried on under the appropriation of April 28, 1904, and that of March 3, 1905. The following are the main features of this work:

RECONSTRUCTION AND IMPROVEMENT OF EXISTING ROADS.

Beginning at about the eleventh mile post from Mammoth Hot Springs on the road to Norris, the road was practically reconstructed by correction of grades and thorough resurfacing with a foundation of broken rock over all soft ground. The same character of work was carried on from Norris Geyser Basin to Gibbon Canyon, and was particularly thorough over the marshy tracts known as Elk Park and the Gibbon Meadows.

From Excelsior Geyser to the Upper Geyser Basin similar work was done, all the sharp pitches being cut out and evened up so as to reduce them to an easy gradient.

From the Upper Geyser Basin to the head of Spring Creek Canyon on the Continental Divide much work of a similar character was done.

A large portion of the road along the Yellowstone River between the lake and the Grand Canyon has been resurfaced with a foundation of rock and a wearing surface of gravel.

The road from Norris to the Grand Canyon, which is the most unsatisfactory location in the park, never having been laid out on any rational system, was largely improved by cutting down the hills and filling the hollows, widening and surfacing and otherwise compensating as far as possible for the defects of the original location. In particular the road down the high hill at the Grand Canyon was relocated so as to give an easy gradient. This stretch of road lies entirely in heavy clay deposits and is exceedingly hard to maintain during the periods of wet weather. It was heavily paved with broken rock which was covered with gravel, and it is believed that it will stand in good shape.

The road from Thumb Station to Lake Outlet, by way of Natural Bridge, was completed by grading to full width and surfacing with the best material available. Along the lake shore at the Thumb the alignment was in many places corrected so as to shorten the distance and even up the gradients.

The road across the summit of Mount Washburn was practically completed, including both the low line through Dunraven Pass and the high line passing over the summit of the mountain. There remains about a half mile on the low line that will require further widening. This road has been one of great difficulty of construction, not only because of the general presence of solid rock in all portions, but particularly because of the shortness of season and the very wet condition of the ground until late in the summer. The road over the summit has been made 18 to 20 feet wide instead of 12 feet as contemplated in the original estimate. This road, it is fully believed, will meet all the expectations of those who have favored its construction and will form one of the finest attractions in the tour of the park.

From Tower Falls to Mammoth Hot Springs the road has been entirely opened and completed as a permanent part of the system, thus completing the belt line or general circuit.

Much work was done on the Cooke City road from Yellowstone River to the northeast boundary of the park. An entirely new alignment was made from the Yellowstone River to near Soda Butte, the road crossing the Lamar River near the mouth of Slough Creek instead of near the mouth of Soda Butte Creek as formerly, and the greater part of it has been opened to travel. The very dangerous piece of road near Soda Butte, known as the Jackson Grade, has been cut out by new road 4,000 feet long on the immediate bank of the Lamar River.

The road from the Grand Canyon to Inspiration Point, which serves to give a fine view of the Grand Canyon, has been largely widened and otherwise improved near its terminus at Inspiration Point.

The road opened early last season from the steel-concrete bridge over the Yellowstone to Artist Point has been completed.

On the east road a large amount of work has been done from Sylvan Pass 12 miles east where it was too narrow for safe travel.

Considerable work has also been done on the west road in the matter of widening it in narrow places and resurfacing and otherwise improving its condition.

BRIDGES

The following bridges have been built during the period above mentioned:

The 5-span steel arch bridge over the Middle Gardiner River which was in progress of erection at the date of the last annual report was duly completed.

The steel truss over the same river at the 7-mile post between Mammoth Hot Springs and Norris was also constructed.

Steel truss bridges were built over Nez Perce Creek near the Fountain Hotel and over the Firehole River above Excelsior Geyser.

A fine steel arch bridge was erected over Tower Creek where the road crosses a short distance above Tower Falls.

A number of wooden bridges were also built, the principal ones being the following:

A large crib structure without trusses over the Lamar River on the Cooke City road.

Bridges over the Big and Little Blacktail creeks on the road between Mammoth Hot Springs and Tower Falls.

Reconstruction of the bridge over the Gibbon River at Norris.

Reconstruction of two bridges over the Firehole River; one on the old road from the Lower Basin to Excelsior Geyser, and the other just above the Upper Geyser Basin.

Relocation and reconstruction of bridges over Trout and Antelope creeks.

Construction of a new bridge over Grinnell Creek on the east road, and the construction of a viaduct by which the road down the mountain on the east side of Sylvan Pass is made to pass over itself in order to secure the necessary reduction of gradient.

Numerous small bridges have been built or reconstructed and most of the existing wooden bridges have been redecked.

CULVERTS.

The policy of the replacing of wooden culverts with vitrified clay pipe has been steadily continued until this work now extends over a greater part of the system.

SPRINKLING.

The sprinkling system heretofore inaugurated has been extended until it now covers 100 miles of road, in accordance with the existing project. The system has given very general satisfaction and works in admirably with the maintenance and repair of the roads.

STATION HOUSES.

Three station houses were built at different points in the park for the use of the superintendent, and small quarters for officers' use were erected at 11 of the stations.

GUARD RAILS, ETC.

A new platform and guard rail was built at the brink of the Lower Fall of the Yellowstone and an inclined stairway built for the convenience of tourists in descending the Canyon on the right bank a short distance below the falls. Guard rails have also been built around the Paintpots at the Fountain and around Mud Geyser.

SIGNS.

The mile posts and sign boards at the road junctions and some other signs have all been repainted.

MAMMOTH HOT SPRINGS.

The grounds at Mammoth Hot Springs have been maintained and the effort to improve conditions at this point has been highly successful; in fact, the improvements amount to a complete revolution of the former unsatisfactory state of things.

GARDINER ENTRANCE.

The improvements at the north entrance to the park have also been maintained and are in satisfactory condition. The Northern Pacific has recently done considerable work at this point under the supervision of this office.

The alfalfa field, which was established for the use of the superintendent in the maintenance of game in the northern part of the park, has proven very successful and has improved the appearance of the roadway for three-fourths of a mile from the north entrance.

PLANT.

The plant pertaining to the work has been brought to a satisfactory state of completeness, and, together with the buildings at Mammoth Hot Springs, forms an ample provision for any future work that is likely to be required.

ESTIMATES.

The work which was undertaken under the continuing appropriation four years ago has been practically completed, and there has also been done considerable work not contemplated in the original estimates. All the roads which it has ever been proposed to build are now open to travel. The road over the summit of Mount Washburn, from Dunraven Pass to the north side of the mountain, 7 miles, has been made an 18 to 20 foot road nearly all the way, instead of a 12-foot road as at first planned. Only a few minor changes of location in some of the older roads remain to be made, and the eastern and southern approaches will not require general enlargement until railway facilities in those directions are materially advanced beyond their present condition. The sprinkling system has been developed to the full extent contemplated and has largely mitigated the dust annoyance on the main circuit. There are but few portions of the roads that can not now be traveled with speed, safety, and comfort equal to what it was hoped to obtain with the funds granted by Congress.

The estimate herewith submitted is therefore for maintenance only, no additional work having been authorized by Congress. It is based upon careful records of the cost of similar work during the past fiscal year, taking into account also the considerable expansion of the system due to the completion of the road from the canyon to Mammoth Hot Springs via Mount Washburn and Tower Falls. It is made up as follows:

General work	$45,000
Sprinkling (an average of 30 sprinklers for 80 days per season)	30,000
Total	75,000

This figure must be considered a minimum. It should be granted in a lump sum under the general head of maintenance.

FUTURE WORK.

Having complied with official requirements in regard to estimates for the maintenance of a completed project, I desire now to submit a statement as to the future needs of this work. While the park is now provided with a thoroughly good road system, the traffic upon it is continually increasing and has in fact practically doubled since the work began four years ago. It has completely outrun the expectations upon which the original estimate was based. If this increase is to continue, and the managers of the park business believe it is, a new situation is created which must be met in the near future.

Main circuit.—There will be first considered the main circuit or belt line which all tourists travel, and also the northern and western approaches which are the only ones that now have important railroad connections. The mileage is about 180 miles, including some extra roads at Mammoth Hot Springs and Gardiner.

Width.—The standard width of 18 feet for the road surface must be widened to at least 25 feet.

Guard walls.—Owing to the more frequent meeting of vehicles and the necessity of turning out where the road is on steep side hill slopes, guard walls will have to be built in all these places. Such walls should be built in mortar and the existing retaining walls should be rebuilt in the same manner.

Fallen timber.—The dead and down timber should be cleared up for a width of 100 feet along each side of the roads as a precaution against forest fires and as a general improvement to the appearance of the roads.

Bridges and culverts.—It has been the policy during the past four years to replace worn-out bridges with concrete or steel, and culverts with vitrified clay pipe. This policy should be continued until all the old structures are so replaced.

Ditches, etc.—As a result of the increase in travel, there has developed a strong demand on the part of the stage companies that the road grade and the ditches be so modified, wherever at all practicable, that teams may be driven off the road on one side or the other in case of meeting runaways. To carry out this requirement generally in a country like this will be an expensive matter, but when the stage companies declare it to be essential to the safety of their passengers it is difficult to resist the demand.

Western approach.—The great development of business on the western approach and the decision of the Union Pacific lines to build to the west boundary make necessary the immediate enlargement of that approach to the full standard of the main circuit.

Sprinkling.—The sprinkling system will have to be somewhat extended, although I do not think that sprinklers will be found necessary on the greater portion of the Mount Washburn division. There should be added 2 sprinklers for the road from Norris to the canyon, 4 for the western approach, and 6 for the road between the canyon and Mammoth Hot Springs via Tower Falls—12 sprinklers in all.

The widening of the roads and making them so that teams can drive out of them, the erection of guard walls where necessary, the reconstruction of the western approach, extension of the sprinkling system, the clearing up of dead and down timber, the replacing of existing wooden bridges and culverts with steel and concrete or vitrified clay pipe, will cost on an average for the 180 miles, $3,000 per mile, or $540,000.

The road surface.—The great problem to be solved is the road-surface problem. During the past four years probably nine-tenths of the main circuit has been surfaced with one kind of material or another. In some places machine-crushed rock has been used, in others hand-broken stone in large pieces for a foundation, with some other material for a surface. Gravel has been used wherever it could be found, and where neither rock nor gravel has been available resort has been had to such local material as actual experience has shown to wear best. The results have been on the whole good, but not sufficient for present needs; and the greater part of the system must be redealt with in a more thorough manner.

There is a dearth of good material nearly everywhere and an entire absence of it in many places. Wherever the cost will not be prohibitory, crushed rock should be used for both foundation and surface, and should be put in by the most approved method and with subdrainage wherever necessary. In some few places a fine quality of natural crushed rock is found. Where rock can not be found that will stand wear and exposure, inferior rock may be used for a foundation, to be covered with the best surfacing material available. Wherever good gravel can be found it should of course be utilized to the utmost. It makes an easier road for horses than rock does and is, altogether, an excellent material. But after all these resources are exhausted there will still remain many miles where there is none of the above material within practicable distance and where it will be necessary to rely upon a well-built dirt road. While it is not possible to make a precise division of the mileage to which these different grades of surfacing will apply, I would roughly estimate that of the 180 miles here considered, about 75 miles can be treated entirely with crushed rock; about 40 miles with rock foundation and gravel or earth surface, and about 40 miles with gravel alone. For the remaining 25 miles, where neither rock nor gravel can be had, recourse must be had to the best natural material that can be found within economical distances. Estimating a width of surfacing of 25 feet and an average depth of 8 inches, the quantity of material required will be about 3,260 cubic yards per mile. The cost of this material in place, including preparation of road bed, rolling, and finishing, and taking an average for all localities near and remote, will be not less than $2.50 per cubic yard for crushed rock, $2 for mixed rock and gravel, $1.50 for gravel, and $1 for selected earth. Applying these figures to the above mileage gives the following results:

75 miles rock work, at $8,150 per mile	$611,250
40 miles mixed work, at $6,520 per mile	260,800
40 miles gravel work, at $4,890 per mile	195,600
25 miles earth work, at $3,260 per mile	81,500
Total	1,149,150

Less important roads.—The 170 miles of the park road system not included in the above embraces the eastern and southern approaches, the road from near Tower Falls to Soda Butte and Cooke City and the various short side roads throughout the park. Until railroads come much nearer the park boundaries on the east and south than at present, these approaches will not need material enlargement beyond their actual condition. The same is true of the Cooke City road. The side roads, where they are constantly in use, should be developed to keep pace with the rest of the system. From the present outlook I believe that the development work necessary on these roads in the next ten years ought not to exceed in cost $150,000.

Summary.—The total cost, therefore, of developing the 350 miles of roads in the park system as outlined above will be:

Widening, guard walls, etc.	$540,000
Surfacing	1,149,150
Less important roads	150,000
Add for contingencies, etc., 10 per cent	183,915
Total	2,023,065

Lest the above cost, with what has already been expended on the roads, may appear excessive, I would invite attention to the fact that the cost of good macadamized roads in eastern sections of the country, where economy of construction is at a maximum, ranges from $5,000 to $8,000 per mile. The Government roads in Porto Rico cost about $12,000 per mile. The total cost to date of actual construction of the 350 miles of roadway in the park is only a little over $3,000 per mile, while the average cost of the completed system

as recommended above will be about $8,700. The cost per mile on the main circuit is of course much greater than this and will probably average $12,000 per mile. But considering the remoteness of the work, the fact that all supplies have to be hauled on an average 40 miles from the railroad, the shortness of the season, which limits general work to about four months, and, lastly, the fact that the work is all in a mountainous country, where conditions are particularly unfavorable, the above cost must, I think, be considered very reasonable.

I submit, for the consideration of the Department and of Congress, the foregoing estimate of the probable cost of perfecting the present system of roads in the park and of bringing them up to the standard of the best European roads. Without making any definite recommendation in the premises, I believe that it would be a measure of sound economy to adopt a new project looking to the accomplishment of this work within a limited time—say ten years. It is a work which can not be indefinitely postponed. The park is growing in importance year by year and the demands upon the roads are increasing. It will be better to recognize and anticipate these needs and provide for them by a regular annual allowance than to wait until necessity compels much larger appropriations.

Very respectfully,

JNO. PITCHER,
Major, Sixth Cavalry, Acting Superintendent.

The SECRETARY OF THE INTERIOR,
Washington, D. C.

Meteorological record, Yellowstone Park, Wyoming, 1904–5.

OCTOBER, 1904.

Date.	Temperature.			Precipitation.	Character of day.	Date.	Temperature.			Precipitation.	Character of day.
	Maximum.	Minimum.	Mean.				Maximum.	Minimum.	Mean.		
	°F.	°F.	°F.	Inch.			°F.	°F.	°F.	Inch.	
1	68	45	56	.....	Clear.	18	36	17	26	.....	Partly cloudy.
2	66	42	54	.....	Do.	19	46	29	38	.....	Do.
3	65	46	56	Tr.	Partly cloudy.	20	53	30	42	.....	Do.
4	60	36	48	Tr.	Do.	21	59	37	48	.....	Do.
5	54	29	42	.....	Clear.	22	60	32	46	.....	Clear.
6	62	33	48	0.01	Cloudy.	23	61	35	48	.....	Partly cloudy.
7	52	38	45	.14	Do.	24	45	27	36	.....	Clear.
8	56	36	46	.01	Partly cloudy.	25	55	21	38	.....	Do.
9	49	36	42	.09	Do.	26	65	29	47	.....	Do.
10	48	33	40	.03	Cloudy.	27	65	30	48	.....	Do.
11	58	32	45	.....	Clear.	28	64	29	46	.....	Do.
12	50	34	42	Tr.	Cloudy.	29	61	27	44	.....	Do.
13	57	34	46	.....	Partly cloudy.	30	58	30	44	.....	Do.
14	60	33	46	.....	Clear.	31	56	30	43	.....	Do.
15	63	33	48	.....	Do.						
16	43	33	38	.14	Cloudy.	Mean	55.8	32.3	44.0	.....	
17	35	24	30	.25	Do.						

Atmospheric pressure.—[Reduced to sea level; inches and hundredths.] Mean, 30.10; highest, 30.56, on 18th; lowest, 29.66, on 15th.

Temperature.—Highest, 68°, on 1st; lowest, 17°, on 18th; greatest daily range, 36°, on 26th; least daily range, 10°, on 16th. Mean for this month in 1904, 44°.

Wind.—Prevailing direction, southwest; total movement, 5,284 miles; maximum velocity (for five minutes), 32 miles per hour, from west, on 15th.

Precipitation.[a]—Total this month in—

	Inches.		Inches.		Inches.
1889	1.32	1896	0.06	1902	0.20
1890	1.68	1897	1.72	1903	.50
1891	1.44	1898	2.25	1904	.67
1892	.79	1899	2.02		
1893	1.34	1900	1.22	Average of this month for 16 years	1.09
1894	.89	1901	.92		
1895	.44				

Deficiency of this month as compared with average of sixteen years, 0.42 inch.

Sunshine and cloudiness.—Number of clear days, 15; partly cloudy, 10; cloudy, 6; on which 0.01 inch or more of rain fell, 7.

Frosts.—Dates of light, 11th, 14th, 15th; dates of heavy, none; date of killing, 17th.

Total snowfall, 2.8 inches.

NOVEMBER, 1904.

Date.	Temperature.			Precipitation.	Character of day.	Date.	Temperature.			Precipitation.	Character of day.
	Maximum.	Minimum.	Mean.				Maximum.	Minimum.	Mean.		
	°F.	°F.	°F.	Inch.			°F.	°F.	°F.	Inch.	
1	57	25	41	.....	Partly cloudy.	17	44	32	38	.....	Partly cloudy.
2	56	30	43	.....	Do.	18	42	29	36	0.03	Cloudy.
3	54	22	38	.....	Clear.	19	30	14	22	.02	Partly cloudy.
4	58	25	42	.....	Do.	20	38	25	32	.....	Cloudy.
5	55	26	40	.....	Do.	21	46	33	40	.....	Partly cloudy.
6	52	24	38	.....	Partly cloudy.	22	45	33	39	.....	Cloudy.
7	56	25	40	.....	Clear.	23	51	30	40	.....	Partly cloudy.
8	52	29	40	.....	Partly cloudy.	24	43	22	32	.....	Do.
9	48	33	40	.....	Do.	25	45	17	31	.....	Do.
10	45	15	30	.....	Clear.	26	52	25	38	.....	Do.
11	52	19	36	.....	Do.	27	51	33	42	Tr.	Do.
12	55	21	38	.....	Do.	28	38	25	32	.12	Do.
13	52	20	36	.....	Do.	29	34	18	26	.....	Cloudy.
14	49	24	36	.....	Do.	30	45	25	35	.....	Partly cloudy.
15	48	29	38	Tr.	Partly cloudy.						
16	37	28	32	0.01	Cloudy.	Mean	47.7	25.2	36.4	.....	

[a] Records prior to 1904 by post surgeon, United States Army.

Meteorological record, Yellowstone Park, Wyoming, 1904–5—Continued.

Atmospheric pressure.—[Reduced to sea level; inches and hundredths.] Mean, 30.23; highest, 30.55, on 10th; lowest, 29.85, on 30th.

Temperature.—Highest, 58°, on 4th; lowest, 14°, on 19th; greatest daily range, 34°, on 12th; least daily range, 9°, on 16th. Mean for this month in 1904, 36°.

Wind.—Prevailing direction, southwest; total movement, 5,749 miles; maximum velocity (for five minutes), 32 miles per hour, from southwest, on 20th.

Precipitation.[a]—Total this month in—

	Inches.		Inches.		Inches.
1889	2.19	1896	3.92	1902	2.35
1890	.49	1897	2.98	1903	1.40
1891	2.00	1898	1.55	1904	.18
1892	1.90	1899	.03		
1893	2.51	1900	1.17	Average of this month for 16 years	1.59
1894	.15	1901	1.25		
1895	1.30				

Deficiency of this month as compared with average of sixteen years, 1.41 inches.

Sunshine and cloudiness.—Number of clear days, 9; partly cloudy, 16; cloudy, 5; on which 0.01 inch or more of rain fell, 4.

Total snowfall, 1.6 inches.

DECEMBER, 1904.

Date.	Temperature.			Precipitation.	Character of day.	Date.	Temperature.			Precipitation.	Character of day.
	Maximum.	Minimum.	Mean.				Maximum.	Minimum.	Mean.		
	°F.	°F.	°F.	*Inch.*			°F.	°F.	°F.	*Inch.*	
1	38	20	29	0.02	Cloudy.	18	35	26	30	Tr.	Partly cloudy.
2	29	11	20	.....	Clear.	19	36	30	33	Tr.	Do.
3	22	1	12	.....	Partly cloudy.	20	37	28	32	.....	Cloudy.
4	26	1	14	.....	Clear.	21	40	32	36	.....	Do.
5	34	7	20	.....	Do.	22	36	12	24	.24	Do.
6	34	8	21	.....	Partly cloudy.	23	26	9	18	.03	Do.
7	42	18	30	.....	Clear.	24	27	21	24	.13	Do.
8	37	22	30	.....	Partly cloudy.	25	23	4	14	.10	Do.
9	35	25	30	.....	Cloudy.	26	10	9	.....	.01	Clear.
10	33	20	26	.10	Do.	27	17	10	4	.....	Do.
11	28	11	20	Tr.	Do.	28	26	3	14	.....	Do.
12	27	10	18	Tr.	Do.	29	37	20	28	.....	Partly cloudy.
13	26	13	20	Tr.	Do.	30	38	32	35	.05	Cloudy.
14	27	16	22	.01	Do.	31	35	25	30	.39	Do.
15	32	22	27	.10	Do.						
16	24	15	20	.01	Partly cloudy.	Mean	30.5	14.9	22.7	.....	
17	29	18	24	Tr.	Do.						

Atmospheric pressure.—[Reduced to sea level; inches and hundredths.] Mean, 30.17; highest, 30.67, on 27th; lowest, 29.50, on 22d.

Temperature.[a]—Highest, 42°, on 7th; lowest, 10°, on 27th; greatest daily range, 27°, on 27th; least daily range, 6°, on 19th. Mean for this month in—

	°F.		°F.		°F.
1887	21	1894	20	1901	22
1888	22	1895	19	1902	23
1889	25	1896	28	1903	23
1890	28	1897	19	1904	23
1891	18	1898	17		
1892	16	1899	19	Mean of this month for 18 years	22
1893	24	1900	24		

Average daily excess of this month as compared with mean of 18 years, 1°.

Wind.—Prevailing direction, south; total movement, 6,111 miles; maximum velocity (for five minutes), 30 miles per hour, from northwest, on 15th.

Precipitation.[a]—Total this month in—

	Inches.		Inches.		Inches.
1887	2.41	1895	1.29	1902	0.85
1889	8.89	1896	.46	1903	.40
1890	.89	1897	.80	1904	1.19
1891	2.77	1898	.67		
1892	2.17	1899	1.90	Average of this month for 17 years	1.86
1893	1.91	1900	1.18		
1894	1.34	1901	2.53		

Deficiency of this month as compared with average of seventeen years, 0.67 inch.

Sunshine and cloudiness.—Number of clear days, 7; partly cloudy, 8; cloudy, 16; on which 0.01 inch or more of rain fell, 12.

Total snowfall (unmelted), 15.1 inches.

[a] Records prior to 1904 by post surgeon, United States Army.

Meteorological record, Yellowstone Park, Wyoming, 1904–5—Continued.

JANUARY, 1905.

Date.	Temperature.			Precipitation.	Snowfall.	Character of day.	Date.	Temperature.			Precipitation.	Snowfall.	Character of day.
	Maximum.	Minimum.	Mean.					Maximum.	Minimum.	Mean.			
	°F.	°F.	°F.	*Inch.*	*In.*			°F.	°F.	°F.	*Inch.*	*In.*	
1	24	3	14	.....	0.5	Clear.	18	37	24	30	.....	.....	Partly cloudy.
2	27	8	18	.....	.....	Partly cloudy.	19	34	27	30	.....	.....	Cloudy.
3	32	15	24	.....	.....	Do.	20	32	19	26	Tr.	Tr.	Do.
4	28	12	20	.....	.....	Do.	21	32	11	22	Tr.	Tr.	Do.
5	24	6	15	Tr.	Tr.	Do.	22	33	26	30	.01	Tr.	Do.
6	26	3	14	.....	.....	Clear.	23	38	27	32	Tr.	.1	Do.
7	20	1	10	.06	.4	Cloudy.	24	42	31	36	.....	.....	Do.
8	22	− 2	10	Tr.	.4	Partly cloudy.	25	43	27	35	.....	.....	Partly cloudy.
9	21	− 4	8	.....	.....	Do.	26	38	30	34	Tr.	Tr.	Cloudy.
10	12	− 6	3	.....	.....	Do.	27	36	27	32	.01	.1	Do.
11	2	−12	−5	.....	.....	Do.	28	33	20	26	Tr.	Tr.	Partly cloudy.
12	9	−10	.....	.....	.....	Do.	29	20	− 4	8	.12	1.8	Cloudy.
13	23	9	16	.....	.....	Cloudy.	30	20	− 6	7	.....	.....	Partly cloudy.
14	31	17	24	.02	.3	Do.	31	4	−16	−6	.....	.....	Do.
15	39	26	32	.....	.....	Do.							
16	42	30	36	.03	.3	Do.	Mean	27.9	11.9	19.9	.....	.....	
17	40	30	35	.....	.....	Do.							

Atmospheric pressure.—[Reduced to sea level; inches and hundredths.] Mean, 30.28; highest, 30.75, on 2d; lowest, 29.98, on 16th.

Temperature.[a]—Highest, 43°, on 25th; lowest, −16°, on 31st; greatest daily range, 26°, on 30th; least daily range, 7°, on 22d. Mean for this month in—

	°F.		°F.		°F.
1887	19	1895	19	1903	23
1888	11	1896	26	1904	19
1889	15	1897	16	1905	20
1890	10	1898	15		
1891	20	1899	20	Mean of this month for 19 years	18
1892	16	1900	22		
1893	17	1901	21		
1894	17	1902	17		

Absolute maximum for this month for nineteen years, 49°; absolute minimum for this month for nineteen years, −41°; average daily excess of this month as compared with mean of nineteen years, 1.8°; accumulated excess since January 1, 56°; average daily excess since January 1, 1.8°.

Precipitation.[a]—Total this month, 0.25 inch; snowfall, 3.9 inches; greatest precipitation in twenty-four hours, 0.12 inch, on 29th; snow on the ground at end of month, 2.6 inches. Total precipitation this month in—

	Inches.		Inches.		Inches.
1887	7.70	1895	4.76	1903	0.60
1888	3.93	1896	2.21	1904	.93
1889	1.05	1897	1.12	1905	.25
1890	6.70	1898	.31		
1891	.48	1899	4.21	Average of this month for 19 years.	2.28
1892	1.40	1900	.90		
1893	1.82	1901	2.26		
1894	1.82	1902	.96		

Deficiency of this month as compared with average of nineteen years, 2.03 inches; accumulated deficiency since January 1, 2.03 inches.

Wind.—Prevailing direction, south; total movement, 4,389 miles; average hourly velocity, 5.9; maximum velocity (for five minutes), 26 miles per hour, from southwest, on 25th.

Weather.—Number of clear days, 2; partly cloudy, 13; cloudy, 16; on which 0.01 inch or more of precipitation occurred, 6.

[a] Records prior to 1904 by post surgeon, United States Army.

Meteorological record, Yellowstone Park, Wyoming, 1904–5—Continued.

FEBRUARY, 1905.

Date.	Temperature.			Precipitation.	Sunshine.	Character of day.	Date.	Temperature.			Precipitation.	Sunshine.	Character of day.
	Maximum.	Minimum.	Mean.					Maximum.	Minimum.	Mean.			
	°F.	°F.	°F.	Inch.	P. ct.			°F.	°F.	°F.	Inch.	P. ct.	
1	3	−21	− 9	.....	100	Clear.	16	24	.....	12	Tr.	86	Clear.
2	5	−10	− 2	.....	23	Partly cloudy.	17	30	−8	11	.....	100	Do.
3	29	−10	10	.....	87	Clear.	18	39	2	20	.....	80	Partly cloudy.
4	30	8	19	.....	71	Do.	19	40	27	34	.....	57	Do.
5	31	1	16	.....	100	Do.	20	39	30	34	.33	31	Do.
6	35	4	20	.....	100	Do.	21	45	28	36	.....	69	Do.
7	27	14	20	0.01	73	Partly cloudy.	22	50	20	35	.....	100	Clear.
8	21	8	14	.02	37	Do.	23	43	22	32	.....	60	Partly cloudy.
9	18	3	10	.....	58	Do.	24	46	29	38	.....	36	Do.
10	8	−20	− 6	.16	30	Cloudy.	25	47	28	38	.....	98	Clear.
11	−11	−32	−22	.....	100	Clear.	26	43	24	34	Tr.	98	Do.
12	1	−36	−18	.02	80	Do.	27	50	18	34	.....	100	Do.
13	13	− 5	4	.06	40	Partly cloudy.	28	50	16	33	.....	100	Do.
14	24	− 6	9	.....	100	Clear.							
15	35	− 1	17	.....	100	Do.	Mean	29.1	4.8	17.0	.....	.....	

Atmospheric pressure.—[Reduced to sea level; inches and hundredths.] Mean, 30.24; highest, 30.69, on 14th; lowest, 29.77, on 8th.

Temperature.[a]—Highest, 50°, on 22d; lowest, −36°, on 12th; greatest daily range, 39°, on 3d; least daily range, 9° on 20th. Mean for this month in—

	°F.		°F.		°F.
1887	14	1894	12	1902	27
1888	27	1895	19	1903	13
1889	20	1896	25	1904	21
1890	18	1897	20	1905	17
1891	14	1898	25		
1892	24	1899	11	Mean of this month for 18 years	19
1893	16	1901	18		

Absolute maximum for this month for eighteen years, 50°; absolute minimum for this month for nineteen years, −36°; average daily deficiency of this month as compared with mean of eighteen years, 2°

Precipitation.[a]—Total this month, 0.60 inch; snowfall, 7.5 inches; greatest precipitation in twenty-four hours, 0.33 inch, on 20th; snow on the ground at end of month, 0.2 inch. Total precipitation this month in—

	Inches.		Inches.		Inches.
1887	4.65	1895	0.34	1903	0.25
1888	2.02	1896	2.07	1904	1.50
1889	1.93	1897	.80	1905	.60
1890	6.65	1898	1.21		
1891	2.79	1899	3.40	Average of this month for 19 years.	1.85
1892	2.10	1900	1.65		
1893	.79	1901	.72		
1894	1.12	1902	.61		

Deficiency of this month as compared with average of nineteen years, 1.25 inches; accumulated deficiency since January 1, 3.28 inches.

Wind.—Prevailing direction, south; total movement, 4,746 miles; average hourly velocity, 7.1; maximum velocity (for five minutes), 27 miles per hour, from northwest, on 8th.

Weather.—Number of clear days, 16; partly cloudy, 11; cloudy, 1; on which 0.01 inch or more of precipitation occurred, 6.

Miscellaneous phenomena (dates of).—Auroras, 3d.

[a] Records prior to 1904 by post surgeon, United States Army.

Meteorological record, Yellowstone Park, Wyoming, 1904–5—Continued.

MARCH, 1905.

Date.	Temperature.			Precipitation.	Sunshine.	Character of day.	Date.	Temperature.			Precipitation.	Sunshine.	Character of day.
	Maximum.	Minimum.	Mean.					Maximum.	Minimum.	Mean.			
	°F.	°F.	°F.	*Inch.*	*P.ct.*			°F.	°F.	°F.	*Inch.*	*P.ct.*	
1	53	20	36	.....	100	Clear.	18	47	29	38	Tr.	19	Cloudy.
2	60	22	41	.....	86	Do.	19	38	27	32	.....	24	Do.
3	57	24	40	.....	100	Do.	20	45	28	36	.03	50	Partly cloudy.
4	58	26	42	.....	78	Partly cloudy.	21	42	27	34	.17	22	Cloudy.
5	54	25	40	.....	72	Do.	22	37	22	30	Tr.	38	Partly cloudy.
6	44	27	36	0.02	9	Cloudy.	23	36	18	27	.04	26	Cloudy.
7	40	18	29	.....	100	Clear.	24	37	20	28	.17	10	Do.
8	55	22	38	.....	100	Do.	25	42	20	31	.01	38	Partly cloudy.
9	44	26	35	Tr.	88	Partly cloudy.	26	42	25	34	.32	.....	Cloudy.
10	36	18	27	.01	63	Do.	27	34	18	26	.....	56	Partly cloudy.
11	18	5	12	.28	36	Cloudy.	28	32	11	22	.04	43	Do.
12	25	5	15	.02	39	Do.	29	37	23	30	.21	1	Cloudy.
13	44	12	28	.....	.....	Do.	30	40	21	30	.02	26	Do.
14	50	30	40	.07	32	Do.	31	39	13	26	.....	100	Clear.
15	51	26	38	.....	57	Partly cloudy.							
16	52	25	38	.....	38	Do.	Mean	43.3	21.3	32.3	.....	.....	
17	54	28	41	.....	53	Do.							

Atmospheric pressure.—[Reduced to sea level; inches and hundredths.] Mean, 29.99: highest, 30.46, on 2d; lowest, 29.44, on 29th.

Temperature.[a]—Highest, 60°, on 2d; lowest, 5°, on 11th; greatest daily range, 38°, on 2d; least daily range, 11°, on 19th. Mean for this month in—

	°F.		°F.		°F.
1887	36	1894	27	1902	25
1888	23	1896	25	1903	29
1889	36	1897	20	1904	26
1890	26	1898	21	1905	32
1891	22	1899	23		
1892	28	1900	34	Mean of this month for 18 years	27
1893	24	1901	27		

Absolute maximum for this month for eighteen years, 60°; absolute minimum for this month for nineteen years, −22°; average daily excess of this month as compared with mean of eighteen years, 5.4°; accumulated excess since January 1, 1.67°; average daily excess since January 1, 1.9°.

Precipitation.[a]—Total this month, 1.41 inches; snowfall, 17.1 inches; greatest precipitation in twenty-four hours, 0.32 inch, on 26th; snow on the ground at end of month. 0.2 inch. Total precipitation this month in—

	Inches.		Inches.		Inches.
1888	3.12	1895	2.79	1902	2.46
1889	.53	1896	2.62	1903	.85
1890	4.92	1897	1.06	1904	2.98
1891	2.41	1898	1.40	1905	1.41
1892	3.05	1899	3.00		
1893	.96	1900	3.13	Average of this month for 18 years.	2.08
1894	2.30	1901	1.46		

Deficiency of this month as compared with average of eighteen years, 0.67 inch; accumulated deficiency since January 1, 3.95 inches.

Wind.—Prevailing direction, south; total movement, 5,623 miles; average hourly velocity, 7.6; maximum velocity (for five minutes), 32 miles per hour, from northwest, on 26th.

Weather.—Number of clear days, 6; partly cloudy, 12; cloudy, 13; on which 0.01 inch or more of precipitation occurred, 14.

[a] Records prior to 1904 by post surgeon, United States Army.

Meteorological record, Yellowstone Park, Wyoming, 1904–5—Continued.

APRIL, 1905.

Date.	Temperature.			Precipitation.	Sunshine.	Character of day.	Date.	Temperature.			Precipitation.	Sunshine.	Character of day.
	Maximum.	Minimum.	Mean.					Maximum.	Minimum.	Mean.			
	°F.	°F.	°F.	Inch.	P.ct.			°F.	°F.	°F.	Inch.	P.ct.	
1	47	14	30	.....	100	Clear.	17	45	18	32	.....	79	Partly cloudy.
2	46	19	32	.....	76	Partly cloudy.	18	58	26	42	Tr.	64	Do.
3	35	19	27	0.05	85	Do.	19	47	33	40	0.04	8	Cloudy.
4	53	12	32	.....	100	Clear.	20	50	30	40	.....	49	Partly cloudy.
5	57	22	40	.....	100	Do.	21	55	33	44	Tr.	40	Do.
6	60	27	44	.....	100	Do.	22	59	29	44	.30	61	Do.
7	61	30	46	.....	87	Partly cloudy.	23	57	35	46	.....	47	Do.
8	56	31	44	.25	41	Do.	24	60	29	44	.....	58	Do.
9	33	19	26	.40	13	Cloudy.	25	61	37	49	Tr.	69	Do
10	32	16	44	.....	83	Clear.	26	55	29	42	.02	62	Do.
11	50	7	28	.....	100	Do.	27	45	28	36	Tr.	31	Cloudy.
12	50	25	38	.....	81	Partly cloudy.	28	50	27	38	.....	66	Partly cloudy.
13	54	23	38	.....	57	Do.	29	50	29	40	Tr.	27	Cloudy.
14	46	19	32	.01	58	Do.	30	60	33	46	.04	38	Do.
15	39	23	31	.05	40	Cloudy.							
16	27	19	23	.36	23	Do.	Mean	49.9	24.7	37.3	.....	.....	

Atmospheric pressure.—[Reduced to sea level; inches and hundredths.] Mean, 29.95; highest, 30.46, on 4th; lowest, 29.43, on 12th.

Temperature.[a]—Highest, 61°, on 25th; lowest, 7°, on 11th; greatest daily range, 43°, on 11th; least daily range, 8°, on 16th. Mean for this month in—

	°F.		°F.		°F.
1887	39	1894	38	1902	37
1888	43	1896	34	1903	37
1889	43	1897	38	1904	39
1890	39	1898	40	1905	37
1891	41	1899	36		
1892	32	1900	42	Mean of this month for 18 years	38
1893	31	1901	36		

Absolute maximum for this month for eighteen years, 77°; absolute minimum for this month for nineteen years, zero; average daily deficiency of this month as compared with mean of eighteen years, 0.6°; accumulated excess since January 1, 1.49°; average daily excess since January 1, 1.2°.

Precipitation.[a]—Total this month, 1.52 inches; snowfall, 11.9 inches; greatest precipitation in twenty four hours, 0.59 inch, on 8th and 9th. Total precipitation this month in—

	Inches.		Inches.		Inches.
1887	1.40	1895	0.61	1902	2.14
1889	.92	1896	1.29	1903	.80
1890	1.39	1897	1.21	1904	.96
1891	.18	1898	.95	1905	1.52
1892	.92	1899	2.30		
1893	.97	1900	1.93	Average of this month for 18 years	1.25
1894	1.87	1901	1.08		

Excess of this month as compared with average of eighteen years, 0.27 inch; accumulated deficiency since January 1, 3.68 inches.

Wind.—Prevailing direction, southwest; total movement, 5,182 miles; average hourly velocity, 7.2; maximum velocity (for five minutes), 38 miles per hour, from south, on 26th.

Weather.—Number of clear days, 6; partly cloudy, 17; cloudy, 7; on which 0.01 inch or more of precipitation occurred, 10.

Miscellaneous phenomena (dates of).—Solar halos, 12th, 13th, and 24th.

[a] Records prior to 1904 by post surgeon, United States Army.

Meteorological record, Yellowstone Park, Wyoming, 1904–5—Continued.

MAY, 1905.

Date	Temperature.			Precipitation.	Sunshine.	Character of day.	Date.	Temperature.			Precipitation.	Sunshine.	Character of day.
	Maximum.	Minimum.	Mean.					Maximum.	Minimum.	Mean.			
	°F.	°F.	°F.	Inch.	P.ct.			°F.	°F.	°F.	Inch.	P.ct.	
1	50	36	43	Tr.	14	Cloudy.	18	45	28	36	0.24	19	Cloudy.
2	44	32	38	0.25	18	Do.	19	60	24	42	.....	100	Clear.
3	38	30	34	.....	.....	Do.	20	65	33	49	.15	49	Partly cloudy.
4	44	28	36	.....	60	Partly cloudy.	21	44	30	37	.18	40	Do.
5	52	21	36	.....	74	Do.	22	53	25	39	.10	56	Do.
6	54	30	42	Tr.	42	Do.	23	49	35	42	.....	14	Cloudy.
7	62	30	46	.....	83	Do.	24	56	34	45	Tr.	30	Do.
8	47	34	40	.39	10	Cloudy.	25	55	32	44	.03	49	Partly cloudy.
9	37	29	33	.16	.....	Do.	26	44	35	40	.40	.....	Cloudy.
10	40	27	34	Tr.	40	Partly cloudy.	27	49	33	41	.40	18	Do.
11	45	26	36	.01	32	Cloudy.	28	52	35	44	.04	22	Do.
12	48	29	38	.01	26	Do.	29	60	39	50	.04	25	Do.
13	51	32	42	.03	40	Partly cloudy.	30	64	38	51	.01	59	Partly cloudy.
14	56	38	47	.....	43	Do.	31	71	38	54	.01	53	Do.
15	57	35	46	.....	100	Clear.							
16	68	28	48	.....	87	Partly cloudy.	Mean	52.5	31.6	42.0	.....	.....	
17	68	37	52	.01	40	Do.							

Atmospheric pressure.—[Reduced to sea level; inches and hundredths.] Mean, 29.88; highest, 30.28, on 16th; lowest, 29.32, on 9th.

Temperature.[a]—Highest, 71°, on 31st; lowest, 21°, on 5th; greatest daily range, 40°, on 16th; least daily range, 8°, on 3d. Mean for this month in—

	°F.		°F.		°F.
1887	49	1895	46	1903	45
1888	46	1896	41	1904	45
1889	47	1897	54	1905	42
1890	50	1898	45		
1891	50	1899	42	Mean of this month for 19 years	47
1892	42	1900	50		
1893	43	1901	52		
1894	50	1902	48		

Absolute maximum for this month for eighteen years, 89°; absolute minimum for this month for nineteen years, 15°; average daily deficiency of this month as compared with mean of nineteen years, 4.7°; accumulated excess since January 1, 3°.

Precipitation.—Total this month, 2.46 inches; snowfall, 6.7 inches; greatest precipitation in twenty-four hours, 0.48 inch, on 8th and 9th. Total precipitation this month in—

	Inches.		Inches.		Inches.
1889	1.40	1896	3.85	1903	0.65
1890	2.00	1897	1.55	1904	1.31
1891	2.12	1898	1.95	1905	2.46
1892	2.06	1899	2.52		
1893	1.01	1900	2.42	Average of this month for 17 years	1.97
1894	2.26	1901	2.72		
1895	1.68	1902	1.59		

Excess of this month as compared with average of seventeen years, 0.49 inch; accumulated deficiency since January 1, 3.19 inches.

Wind.—Prevailing direction, northwest; total movement, 5,722 miles; average hourly velocity, 7.7; maximum velocity (for five minutes), 40 miles per hour, from west, on 20th.

Weather.—Number of clear days, 2; partly cloudy, 15; cloudy, 14; on which 0.01 inch or more of precipitation occurred, 18.

Miscellaneous phenomena (dates of).—Thunderstorms, 8th, 17th, 27th. Frost: Light, 6th, 7th, 11th, 16th, 25th; heavy, 5th, 19th.

[a] Records prior to 1904 by post surgeon, United States Army.

Meteorological record, Yellowstone Park, Wyoming, 1904–5—Continued.

JUNE, 1905.

Date.	Temperature.			Precipitation.	Character of day.	Date.	Temperature.			Precipitation.	Character of day.
	Maximum.	Minimum.	Mean.				Maximum.	Minimum.	Mean.		
	°F.	°F.	°F.	Inch.			°F.	°F.	°F.	Inch.	
1	75	39	57	.....	Partly cloudy.	17	40	29	34	1.04	Cloudy
2	73	44	58	.....	Do.	18	52	28	40	.....	Clear.
3	74	44	59	.....	Do.	19	59	33	46	.....	Do.
4	70	42	56	Tr.	Do.	20	62	38	50	.....	Partly cloudy.
5	55	40	48	0.01	Cloudy.	21	67	34	50	.04	Do
6	67	44	56	.....	Partly cloudy.	22	62	38	50	.31	Cloudy.
7	77	36	56	.....	Clear.	23	41	34	38	.08	Do.
8	70	42	56	.41	Partly cloudy.	24	48	34	41	.20	Do.
9	49	40	44	.43	Cloudy.	25	56	39	48	.....	Partly cloudy.
10	58	39	48	.11	Do.	26	64	43	54	.....	Clear.
11	68	42	55	.....	Clear.	27	71	40	56	.....	Do.
12	65	40	52	.25	Partly cloudy.	28	65	36	50	.....	Do.
13	64	35	50	.....	Do.	29	71	37	54	.....	Partly cloudy.
14	67	37	52	.04	Do.	30	73	39	56	.....	D
15	55	37	46	.13	Cloudy.						
16	55	31	43	.....	Partly cloudy.	Mean	62.4	37.8	50.1	.....	

Atmospheric pressure.—[Reduced to sea level; inches and hundredths.] Mean, 29.84; highest, 30.07, on 11th; lowest, 29.60, on 4th.

Temperature.[a]—Highest, 77°, on 7th; lowest, 28°, on 18th; greatest daily range, 41°, on 7th; least daily range, 7°, on 23d. Mean for this month in—

	°F.		°F.		°F.
1887	57	1895	51	1903	57
1888	55	1896	56	1904	52
1889	57	1897	54	1905	50
1890	54	1898	55		
1891	51	1899	53	Mean of this month for 19 years	54
1892	52	1900	52		
1893	55	1901	50		
1894	58	1902	54		

Absolute maximum for this month for nineteen years, 92°; absolute minimum for this month for nineteen years, 20°; average daily deficiency of this month as compared with mean of nineteen years, 3.7°; accumulated deficiency since January 1, 1.08°; average daily deficiency since January 1, 0.6°.

Precipitation.[a]—Total this month, 3.05 inches; snowfall, 8 inches; greatest precipitation in twenty-four hours, 1.04 inches, on 17th. Total precipitation this month in—

	Inches.		Inches.		Inches.
1889	0.66	1896	0.73	1903	0.90
1890	.94	1897	2.34	1904	1.03
1891	3.05	1898	2.67	1905	3.05
1892	1.46	1899	1.90		
1893	.38	1900	1.17	Average of this month for 17 years	1.73
1894	3.10	1901	1.43		
1895	2.71	1902	1.87		

Excess of this month as compared with average of seventeen years, 1.32; accumulated deficiency since January 1, 1.87 inches.

Wind.—Prevailing direction, southwest; total movement, 5,006 miles; average hourly velocity, 7; maximum velocity (for five minutes), 37 miles per hour, from southwest, on 27th.

Weather.—Number of clear days, 7; partly cloudy, 15; cloudy, 8; on which 0.01 inch or more of precipitation occurred, 12.

Miscellaneous phenomena (dates of).—Solar halos, 1st, 2d; hail, 8th; thunderstorms, 4th, 8th, 12th, 14th, 24th. Frost: Light, 13th, 16th, 19th; heavy, 18th.

[a] Records prior to 1904 by post surgeon, United States Army.

Meteorological record, Yellowstone Park, Wyoming, 1904–5—Continued.

JULY, 1905.

Date.	Temperature.			Precipitation.	Sunshine.	Character of day.	Date.	Temperature.			Precipitation.	Sunshine.	Character of day.
	Maximum.	Minimum.	Mean.					Maximum.	Minimum.	Mean.			
	°F.	°F.	°F.	Inch.	P.ct.			°F.	°F.	°F.	Inch.	P.ct.	
1	61	41	51	0.13	17	Cloudy.	18	79	40	60	.....	100	Clear.
2	62	38	50	Tr.	38	Partly cloudy.	19	75	50	62	.....	71	Partly cloudy.
3	71	36	54	.....	90	Clear.	20	81	47	64	.....	100	Clear.
4	69	43	56	.....	79	Partly cloudy.	21	82	45	64	.....	100	Do.
5	73	37	55	.....	100	Clear.	22	82	48	65	.....	97	Do.
6	74	40	57	.....	78	Partly cloudy.	23	82	47	64	Tr.	93	Do.
7	71	42	56	.....	96	Clear.	24	84	48	66	.05	77	Partly cloudy
8	70	40	55	.....	100	Do.	25	78	50	64	Tr.	65	Do.
9	82	40	61	.....	100	Do.	26	74	49	62	.18	40	Do.
10	84	48	66	Tr.	86	Do.	27	73	43	58	Tr.	50	Do.
11	81	48	64	.05	65	Partly cloudy.	28	73	46	60	.09	84	Do.
12	80	44	62	.....	94	Clear.	29	73	43	58	Tr.	84	Clear.
13	80	48	64	.....	100	Do.	30	76	43	60	Tr.	72	Partly cloudy
14	76	52	64	.02	44	Partly cloudy.	31	75	49	62	.07	49	Do.
15	70	46	58	.75	42	Do.							
16	72	42	57	.04	95	Clear.	Mean	75.2	44.5	59.8	.....	.....	
17	69	47	58	.....	96	Do.							

Atmospheric pressure.—[Reduced to sea level; inches and hundredths.] Mean, 29.99; highest, 30.27, on 8th; lowest, 29.71, on 11th.

Temperature.[a]—Highest, 84°, on 10th; lowest, 36°, on 3d; greatest daily range, 42°, on 9th; least daily range, 20°, on 1st. Mean for this month in—

	°F.		°F.		°F.
1887	64	1895	60	1902	58
1888	64	1896	62	1903	60
1889	63	1897	60	1904	58
1890	66	1898	62	1905	60
1891	60	1899	61		
1892	62	1900	61	Mean of this month for 18 years	62
1894	66	1901	67		

Absolute maximum for this month for eighteen years, 96°; absolute minimum for this month for eighteen years, 30°; average daily deficiency of this month as compared with mean of eighteen years, 2.1°; accumulated deficiency since January 1, 1.73°; average daily deficiency since January 1, 0.8°.

Precipitation[a].—Total this month, 1.38 inches; greatest precipitation in twenty-four hours, 0.75 inch, on 15th. Total precipitation this month in—

	Inches.		Inches.		Inches.
1889	0.56	1896	2.09	1903	0.55
1890	.99	1897	1.11	1904	1.11
1891	3.15	1898	1.15	1905	1.38
1892	.98	1899	1.42		
1893	.99	1900	.80	Average of this month for 17 years	1.24
1894	.99	1901	.92		
1895	.57	1902	2.29		

Excess of this month as compared with average of seventeen years, 0.14 inch; accumulated deficiency since January 1, 1.73 inches.

Wind.—Prevailing direction, southwest; total movement, 4,742 miles; average hourly velocity, 6; maximum velocity (for five minutes), 33 miles per hour, from northwest, on 23d.

Weather.—Number of clear days, 16; partly cloudy, 14; cloudy, 1; on which 0.01 inch or more of precipitation occurred, 9.

Miscellaneous phenomena (dates of).—Hail, 11th, 31st; thunderstorms, 1st, 10th, 11th, 14th, 15th, 20th, 23d, 24th, 25th, 26th, 28th, 30th, 31st. Frost: Light, 3d.

[a] Records prior to 1904 by post surgeon, United States Army.

Meteorological record, Yellowstone Park, Wyoming, 1904–5—Continued.

AUGUST, 1905.

Date.	Temperature.			Precipitation.	Sunshine.	Character of day.	Date.	Temperature.			Precipitation.	Sunshine.	Character of day.
	Maximum.	Minimum.	Mean.					Maximum.	Minimum.	Mean.			
	°F.	°F.	°F.	Inch.	P.ct.			°F.	°F.	°F.	Inch.	P.ct.	
1	76	44	60	Tr.	80	Clear.	18	71	38	54	.....	78	Partly cloudy.
2	81	45	63	.....	74	Partly cloudy.	19	79	41	60	.....	99	Clear.
3	77	53	65	0.03	51	Do.	20	82	50	66	.....	65	Partly cloudy.
4	78	45	62	.....	81	Clear.	21	79	46	62	.....	88	Clear.
5	71	48	60	.....	59	Partly cloudy.	22	77	52	64	0.05	40	Partly cloudy.
6	81	40	60	.....	96	Clear.	23	75	51	63	.14	73	Do.
7	84	46	65	Tr.	81	Partly cloudy.	24	83	46	64	.....	90	Clear.
8	85	49	67	.....	100	Clear.	25	72	57	64	Tr.	24	Cloudy.
9	79	47	63	Tr.	43	Partly cloudy.	26	76	52	64	.....	62	Partly cloudy.
10	70	46	58	.01	20	Cloudy.	27	80	49	64	Tr.	61	Do.
11	78	41	60	.01	69	Partly cloudy.	28	79	54	66	.....	100	Clear.
12	76	44	60	.....	49	Do.	29	80	52	66	.....	96	Do.
13	80	47	64	.08	53	Do.	30	76	56	66	Tr.	68	Partly cloudy.
14	78	44	61	.....	92	Clear	31	68	46	57	.....	100	Clear.
15	69	41	55	.....	82	Do.							
16	63	36	50	.....	46	Cloudy.	Mean	76.3	46.8	61.6	.....	.....	
17	62	45	54	Tr.	21	Do.							

Atmospheric pressure.—[Reduced to sea level; inches and hundredths.] Mean, 29.97; highest, 30.27, on 6th; lowest, 29.65, on 15th.

Temperature.[a]—Highest, 85°, on 8th; lowest, 36°, on 16th; greatest daily range, 41°, on 6th; least daily range, 15°, on 25th. Mean for this month in—

	°F.		°F.		°F.
1887	61	1895	62	1902	59
1888	61	1896	60	1903	61
1889	64	1897	62	1904	60
1890	61	1898	63	1905	62
1891	62	1899	57		
1892	61	1900	61	Mean of this month for 18 years	62
1894	68	1901	63		

Absolute maximum for this month for nineteen years, 93°; absolute minimum for this month for eighteen years, 30°; average daily excess or deficiency of this month as compared with mean of eighteen years, 0.0°; accumulated deficiency since January 1, 1.73°; average daily deficiency since January 1, 0.7°.

Precipitation[a].—Total this month, 0.32 inch; greatest precipitation in twenty-four hours, 0.19 inch, on 22d and 23d. Total precipitation this month in—

	Inches.		Inches.		Inches.
1889	0.64	1896	0.37	1903	0.45
1890	1.77	1897	.57	1904	1.11
1891	1.22	1898	2.05	1905	.32
1892	.64	1899	2.23		
1893	1.06	1900	.29	Average of this month for 17 years	1.03
1894	1.75	1901	1.65		
1895	.72	1902	.61		

Deficiency of this month as compared with average of seventeen years, 0.71 inch; accumulated deficiency since January 1, 2.44 inches.

Wind.—Prevailing direction, southwest; total movement, 5,247 miles; average hourly velocity, 7; maximum velocity (for five minutes), 33 miles per hour, from west, on 9th.

Weather.—Number of clear days, 12; partly cloudy, 15; cloudy, 4; on which 0.01 inch or more of precipitation occurred, 6.

Miscellaneous phenomena (dates of).—Halos: Solar, 16th, 24th; lunar, 11th. Thunderstorms, 1st, 2d, 3d, 7th, 9th, 10th, 11th, 12th, 13th, 22d, 27th, 29th. Frost: Light, 16th.

[a] Records prior to 1904 by post surgeon, United States Army.

Meteorological record, Yellowstone Park, Wyoming, 1904–5—Continued.

SEPTEMBER, 1905.

Date.	Temperature.			Precipitation.	Sunshine.	Character of day.	Date.	Temperature.			Precipitation.	Sunshine.	Character of day.
	Maximum.	Minimum.	Mean.					Maximum.	Minimum.	Mean.			
	°F.	°F.	°F.	Inch.	P. ct.			°F.	°F.	°F.	Inch.	P. ct.	
1	66	35	50	.....	100	Clear.	17	56	32	44	0.01	44	Partly cloudy.
2	74	34	54	.....	86	Do.	18	58	25	42	.....	90	Clear.
3	75	40	58	.....	36	Partly cloudy.	19	66	34	50	.....	100	Do.
4	67	47	57	0.01	20	Cloudy.	20	70	49	60	.....	63	Partly cloudy.
5	69	42	56	.06	30	Partly cloudy.	21	76	46	61	Tr.	74	Do.
6	72	36	54	.....	85	Clear.	22	79	43	61	.....	100	Clear.
7	75	37	56	.....	100	Do.	23	83	42	62	.....	100	Do.
8	74	41	58	Tr.	62	Partly cloudy.	24	71	46	58	.04	28	Partly cloudy.
9	75	41	58	.....	78	Do.	25	61	43	52	.01	69	Do.
10	75	44	60	.....	73	Do.	26	65	47	56	.....	72	Do.
11	74	48	61	Tr.	44	Do.	27	73	41	57	.....	68	Do.
12	74	45	60	.02	80	Clear.	28	68	41	54	.11	56	Do.
13	68	41	54	Tr.	70	Partly cloudy.	29	41	30	36	.91	.....	Cloudy.
14	64	36	50	.....	92	Clear.	30	44	29	36	Tr.	50	Partly cloudy.
15	66	34	50	.....	74	Partly cloudy.							
16	69	32	50	.....	77	Do.	Mean	68.3	39.4	53.8	.....	.....	

Atmospheric pressure.—[Reduced to sea level; inches and hundredths.] Mean, 29.93; highest, 30.28, on 2d; lowest, 29.45, on 28th.

Temperature.[a]—Highest, 83°, on 23d; lowest, 25°, on 18th; greatest daily range, 41°, on 23d; least daily range, 11°, on 29th. Mean for this month in—

	°F.		°F.		°F.
1887	56	1895	50	1902	51
1888	59	1896	49	1903	49
1889	50	1897	55	1904	52
1890	53	1898	52	1905	54
1891	52	1899	55		
1892	55	1900	50	Mean of this month for 18 years	52
1894	54	1901	48		

Absolute maximum for this month for nineteen years, 88°; absolute minimum for this month for eighteen years, 0°; average daily excess of this month as compared with mean of eighteen years, 1.4°; accumulated deficiency since January 1, 1.31°; average daily deficiency since January 1, 0.5°.

Precipitation.[a]—Total this month, 1.17 inches; snowfall, 7.1 inches; greatest precipitation in twenty-four hours, 0.98 inch, on 28th and 29th; snow on the ground at end of month, trace. Total precipitation this month in—

	Inches.		Inches.		Inches.
1889	0.59	1896	1.10	1903	0.60
1890	.19	1897	.31	1904	.73
1891	1.74	1898	.90	1905	1.17
1892	1.60	1899	.90		
1893	1.44	1900	.87	Average of this month for 17 years	1.00
1894	.71	1901	2.85		
1895	.43	1902	.90		

Excess of this month as compared with average of seventeen years, 0.17 inch; accumulated deficiency since January 1, 2.27 inches.

Wind.—Prevailing direction, southwest; total movement, 6,034 miles; average hourly velocity, 8; maximum velocity (for five minutes), 37 miles per hour, from southwest, on 28th.

Weather.—Number of clear days, 10; partly cloudy, 18; cloudy, 2; on which 0.01 inch or more of precipitation occurred, 8.

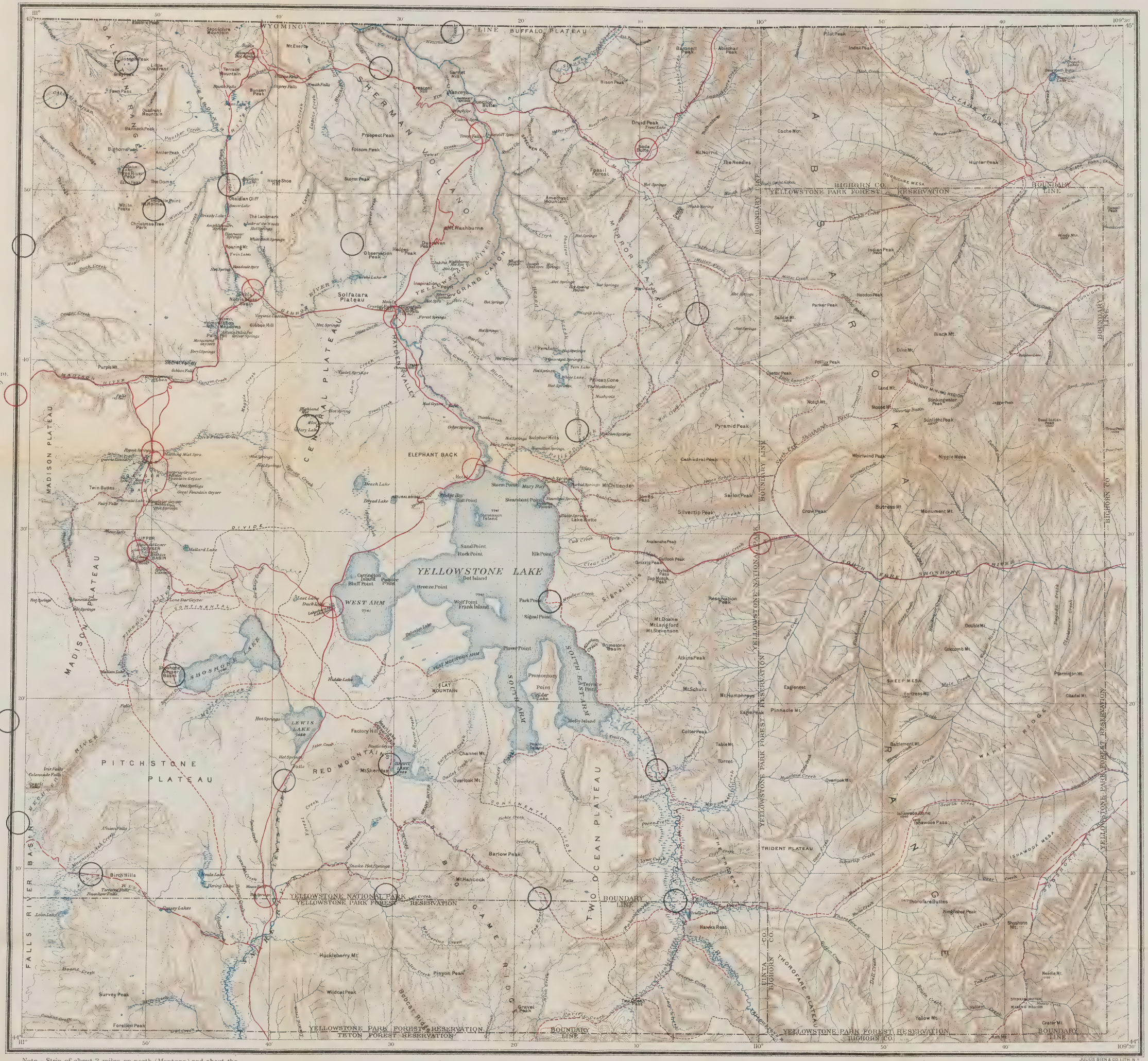
Miscellaneous phenomena (dates of).—Halos: Solar, 9th. Thunderstorms, 4th, 5th. Frost: Light, 1st, 2d, 15th, 16th, 19th, 30th; heavy, 18th.

[a] Records prior to 1904 by the post surgeon, United States Army.

YELLOWSTONE NATIONAL PARK AND PART OF ABUTTING FOREST RESERVE

REPORT SUPERINTENDENT YELLOWSTONE NATIONAL PARK 1905

FROM MAPS BY THE U. S. GEOLOGICAL SURVEY



Note.- Strip of about 2 miles on north (Montana) and about the same on west (Montana & Idaho) not included in map.
The forest reservation on the south and east is only partially shown

Roads and trails are indicated as follows:

Roads completed: ——— Roads available but not now used by Park Transportation Companies — — — — Trails - - - - - -

Snowshoe Cabins

Stations

Scale 250,000

0 1 2 4 6 8 10 12 Miles

Contour Interval 100 feet

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